Abstract: Today agricultural resources are getting to be plainly scarcer and subsequently more profitable. In conjunction with the populace development over a century ago, the requirement for finding new, more effective and economical strategies for agrarian development and paddy cultivation resulted to be more indispensible. To encourage this procedure, we are outlining, a Mobile App framework for accuracy agribusiness which furnishes agriculturists with valuable information about the paddy yield and its condition. Our framework intends to make development more productive as the agriculturist can settle on better educated choices and subsequently spare time and assets.

Introduction

Our System provides a Mobile App which aggregates the ML algorithms for disease identification in the paddy crops. The framework can scale in view of every farmers requests and the subsequent gathering of data may speak to an important asset for future. The Major objectives are: • To construct a database to store paddy disease information. • To find out the affected disease based on disease infected crop images using deep CNN & SVM classifier. • To build a database for paddy disease syndromes and treatment possibilities.

Proposed System Model

The proposed Smart Paddy Pest Management model of the proposed system includes two modules:

Disease Identification is all about detecting what type of infection is occurred in the paddy crop. Disease Management is about determining the result of disease identification which are intimated to the farmer through mobile app.

Disease Identification

The disease identification process depicted in figure 1 is implemented with the help of mobile application. It is a four step process namely: 1) Image capture & selection 2) Image zoom and crop, 3) Upload image and 4) Receive notification. Image capture & selection: Diseased affected paddy image is captured through a clear camera. Multiple snapshots are to be taken for choosing the appropriate affected area. A clear image is chosen such that the disease affected areas are clearly visible. In case of same crop problem, choose images from the database which was created earlier; Image Zoom and crop: Choose the best portion of the disease affected image and crop it; Upload Image: Cropped image is to be uploaded in the remote server using the mobile app; Receive notification: Once image has been uploaded in the remote server, pattern matching is performed with the available datasets using pattern matching algorithm, and the precaution is send to the farmer via mobile app by the expert.

Disease Identification

Algorithm

For detecting various paddy crop diseases of Nematode, Blast, Smut, Spots the image processing techniques namely image acquisition, image segmentation, pre-processing feature extraction and classification of image are introduced.

Image acquisition

Diseased affected paddy image is captured through a clear camera. To find the exact disease affected, the RGB color of the cropped image is must be clearly visible as shown in figure 2. This is achieved with the help of a high end mobile camera. These images are stored in either of process able image extension in the database.

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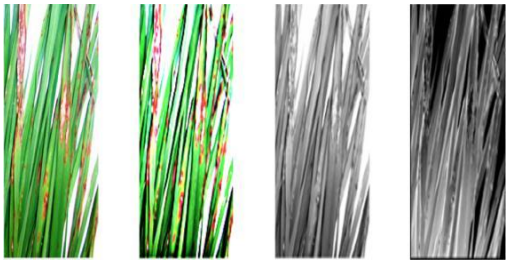


Image segmentation

The image quality is affected by the intensity of camera, flash, external environment factors such as ambient light, frequency distortion etc. These factors act as noise in images. They can be removed by using the deep convolutional neural network CNN algorithm. The deep convolutional network algorithm is used for noise reduction process of disease identification in paddy crops. Using CNN provides the agriculturalist has an advantage of detecting pests at early stages simply by exploring the complex features through mobile application. CNNs are adopted for disease identification in paddy because of their highly automated feature learning techniques from the processed paddy images. Low level paddy crop disease images can also be identified using deep learning architectures. In the whole, for pattern recognition in paddy crop images, the best classifications method is deep learning.

Image classification

A support vector machine (SVM) is used to identify paddy crop disease affected based on plant stem and leaf examination.

In the classification process, the paddy disease dataset is categorized into two sets, one to be training dataset and other the testing dataset. The training dataset is analyzed using deep CNN to extract its features and characteristics for comparison with the testing dataset. The testing dataset is a set of data whose features are to be analyzed and the diseases is to be classified. The SVM classifier performs analysis on the testing dataset and classifies based on the comparison with the training dataset.

Paddy Disease Database Model

For detection of paddy plant diseases, categorically 200 infection influenced test

images are identified and applied to training set. Deep CNN is used to denoise the diseased image datasets categorically based on relevant features. In view of number of iterations, training period and false caution rate differed for different diseases images which were given to the classifier. In chosen 250 images, 50 images are to train with the deep CNN and SVM classifier; remaining 200 images are used for testing The different paddy plant disease images considered are Blast, Brown spot, Bacterial leaf blight (BLB), Sheath blight, False smut, Root knot nematode and White tip nematode. The experimental isolation of pattern spot in paddy crops for diseases such as brown spot, leaf blast and sheath blight etc can be identified.

Algorithm: Paddy crop disease classification using deep CNN & SVM classifier

Input: Paddy crop colored diseased images

Output: Classified diseased images & Preventive Measures.

Step 1: Start

Step 2: Train the 200 selected images with deep CNN & SVM and obtain the features for pattern matching.

Step 3: Select the colored image of a specific disease from testing database.

Step 4: Crop multiple diseased spot from the image and choose the ideal one.

Step 5: Apply deep CNN algorithm for SVM classifier

Step 6: Apply color and texture feature extraction

Step 7: Train the color and texture feature with SVM classifier

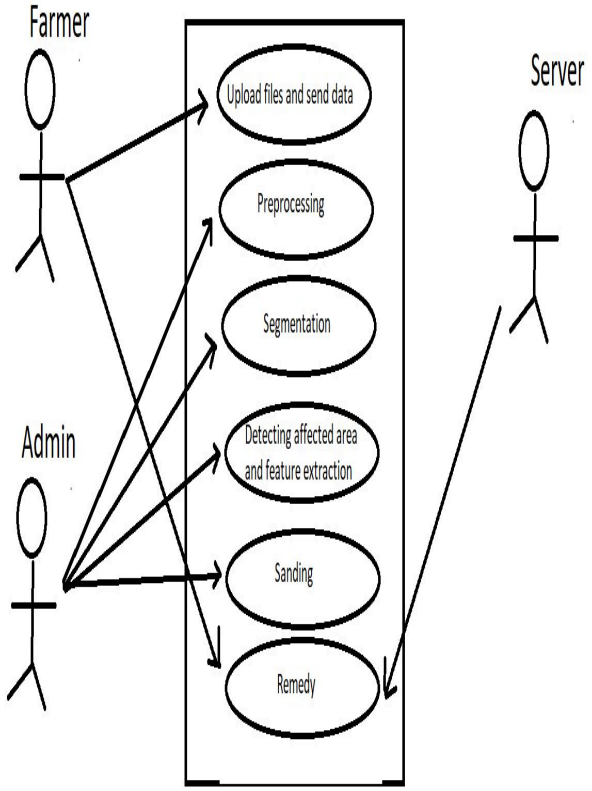
Step 8: Determine and classify the images using deep CNN & SVM

Step 9: Highlight the disease affected and remedial measures

Step 10: Stop.

SAMPLE DATABASE

Common Name	Scientific Name	Image	Description	Remedy
Blast	Pyricularia grisea		Black variations are seen in plant and they begin to break.	Seeds are to be treated with Vitavax power with a volume of 2g.
Brown spot	Bipolaris oryzae		Dark reddish margins are formed in plants leading to blackening of seeds.	Seeds are to be treated with Vitavax power with a volume of 2g.
Bacterial leaf blight (BLB)	Xanthomonas campestris pv. oryzae		Yellow color legions appear on leaf	Seeds are to be treated with plantomycin 10g
Sheath blight	Rhizoctonia solani		Yellow color legions appear on lower leaves.	Seeds are to be treated with Pseudomonas fluorescens @ 10g/kg of seed.


Farmer
Server
Admin
Upload files and send data
Preprocessing
Segmentation
Detecting affected area and feature extraction
Sanding
Remedy

UML Diagram